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An "Inclusion-body" Rhinitis of Pigs (Preliminary Report)*

BY
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Introduction

ALTHOUGH rhinitis in pigs is so common as usually to excite little comment from stockowners, a severe form, which has since been given the name of atrophic rhinitis, has been recognised for over 100 years (Franque, 1829). The deformity of the nasal structures and the check to growth which it produces are now well known, and over the last 15 years a great deal of work has been done in an attempt to elucidate its aetiology, though comparatively little information on its differential diagnosis has been reported.

The purpose of this paper is to present an interim report on a rhinitic condition with certain well-defined and fairly easily recognisable features which we have encountered while looking for atrophic rhinitis and which we have provisionally called "inclusion-body rhinitis" (I.B.R.). It is based upon investigations into naturally occurring cases, as to date we have not had an opportunity to assess the results of our transmission experiments.

Incidence

We first encountered this condition in May 1954 (Done, Munro, & Holroyd, 1954) and a further 11 outbreaks had been traced by the end of November. This is undoubtedly a very small proportion of the actual number of cases occurring, since pigmen tend to look upon the condition as a natural hazard of farming analogous to the common cold of man. Furthermore, the disease produces its maximum effect in the pre-weaning period, a stage at which losses from undiagnosed disease are accepted with surprising equanimity by many pig keepers. Veterinary advice is normally not sought and the condition is generally found in the course of investigating suspected cases of atrophic rhinitis. (Since May 1954 it has been obligatory to report all cases resembling atrophic rhinitis.)

Clinical course of the disease

The condition is generally first noticed when the piglets are about two weeks old. Dyspnoea, sneezing and snuffling are observed and anorexia is usually present. Discharge from the nostrils, at first

* Presented at a meeting of the Association of Veterinary Teachers and Research Workers (Southern Region), on December 20th, 1954.

glairy, soon becomes frankly purulent, yellowish or white in colour, and creamy in consistency. Pus becomes caked round the external nares making respiration increasingly difficult.

Death, sometimes preceded by paresis, may occur at this stage during the first week of the clinical disease, or the condition may follow a subacute course with respiratory embarrassment lasting for a month or more, impaired appetite and a marked check to growth. Lateral rotation of the head suggestive of involvement of the cerebello-pontine angle, has been reported in survivors of two outbreaks but a pathological examination of the brains of these animals has not been carried out.

Mortality may be up to 50 per cent., but the average death rate appears to be round about 10 per cent. Morbidity, on the other hand, is virtually 100 per cent. in affected litters, though not all the piglets are seriously affected. Sows and fattening pigs do not appear to contract the disease naturally, or, if they do, the clinical signs are so slight that they have been overlooked.

Post-mortem findings

Post-mortem examination usually reveals a stunted piglet with an obvious rhinitis, the nasal cavity containing large amounts of pus which in the ethmoid region may be inspissated.

The dorsal and ventral turbinates may be somewhat reduced in size though apparently not necrotic, but necrosis of the ethmoid cells may be present and there may be pus in the facial sinuses.

The lymphatic tissues of the head are markedly congested but usually without purulent foci. A pneumonitis is also generally present, but the significance of this is not clear, a substantial proportion of our pigs being affected with virus pneumonia (V.P.P.), (Betts, 1952).

No significant lesions occurring elsewhere in the carcase have been noticed.

Histopathology

Histopathological study has so far been confined to the turbinate bones and the nasal mucosa generally. This shows a catarrhal inflammation with marked destruction of the mixed glands in the propria and keratinisation of the surface epithelium.

The sequence of changes in affected turbinates seems to be approximately as follows, though most of the stages can often be seen in a single section (Figs. 1 and 2). First, most of the gland cells in a particular group develop a swollen nucleus containing conspicuous intranuclear inclusions. This is followed by necrosis of the glands and ducts. In some cases the necrotic tissue is invaded by bacteria and pockets of pus are formed, but eventually its place is taken by lymphoid and granulation tissues, and healing occurs with fibrosis. Massive lymphoid infiltration of the propria is usually present with the formation of nodules larger and more numerous than those of the normal turbinate. Meanwhile, the surface epithelium, which may have been replaced by a stratified squamous type, has begun to send downgrowths into the propria where they differentiate to form glands and ducts.

Only the structures of epithelial origin are primarily involved and in the absence of secondary bacterial infection the cellular response is almost entirely lymphocytic. Some interference with growth and ossification commonly occurs, but to date the author has not seen anything like the conspicuous decalcification and replacement fibrosis of severe atrophic rhinitis.

Morphology of the inclusion bodies

Affected gland cells can readily be recognised under a low power of the microscope by the characteristic "bird's eye" appearance of the nucleus in sections stained by haematoxylin and eosin (Fig. 3). Within the clearly defined, beaded nuclear membrane lies a strongly basophilic body which may measure up to 15μ (usually 8 to 12μ) at its greatest diameter with indentations at one or more places. At higher magnifications the large intranuclear body can be seen to be a finely granular, morula-like mass with connections to the nuclear membrane around the indentations previously described. The granules are apparently of a uniform size and measure about 0.25μ.

By appropriate staining the indentations can be shown to contain smooth, hyaline, usually globular bodies (Fig. 4) which stain bright pink with Giemsa's stain and are variably phloxinophilic by Lendrum's (1947) phloxine-tartrazine method. They are Feulgen-negative in contradistinction to the larger granular bodies which stain purple by this technique. The smaller bodies measure up to about 3μ in diameter and vary considerably in number in a single nucleus. Although there may be large numbers of indentations of the central intranuclear mass it has not been possible to demonstrate bodies in all of them.

Table I summarises the staining reaction obtained with reasonably fresh turbinates, fixed in 10 per cent. formol-saline and decalcified in the fluid recommended by Jenkins (1921).

TABLE I
STAINING REACTIONS OF THE NUCLEAR STRUCTURES OF AFFECTED GLAND CELLS

Stain	Large Granular Bodies	Small Hyaline Bodies
H & E	Blue black	Pink
Giemsa	Bright blue	Bright pink
Phloxinetartrazine	Reddish-brown to black	Orange to pink
Gram	Red	Pink to colourless
Feulgen ...	Reddish purple	Pale green to colourless

Intranuclear acidophilic bodies are also present in the surface epithelium and in the epithelial downgrowths, but the basophilic granules are absent and attention is not drawn to the cells by the greatly distended nucleus as is the case with the fully differentiated glandular tissue.

Discussion

There seems little doubt that the clinical rhinitis is the direct result of the destruction of the surface epithelium and associated glands in the nasal cavity,

FIG. 1.—T.S. ventral portion of left ventral turbinate of a piglet. Stained H. & E. 27. The section is from a subacute case of inclusion body rhinitis, and shows necrosis of the glandular masses and repair proceeding concurrently. There is also deformity of the bony medulla. (P.809A.)

FIG. 2.—A higher magnification of a portion of FIG. 1. Stained H. & E. 84. Almost all the nuclei of the few remaining gland cells contain conspicuous inclusions. (P.809A.)

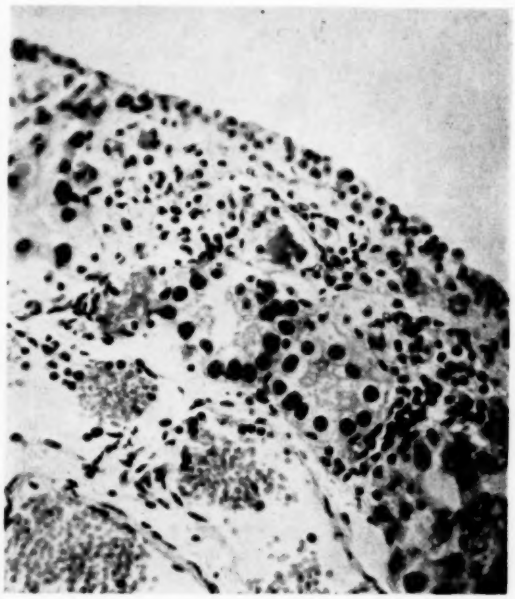

FIG. 3.—A portion of the mucous membrane covering the ventral turbinates, from an acute case in a 17-day-old piglet. Stained H. & E. 353. The majority of the gland cells contain intra-nuclear inclusions. (P.737.)

FIG. 4.—The nucleus of an affected serous gland cell. Stained phloxine-tartrazine. 4,100 approx. The nucleus contains a large central granular mass with peripheral indentations in which are smaller phloxinophilic bodies (indicated by arrows). (P.809A.)

and that the spectacular enlargement of its nucleus and the development of intranuclear inclusions are signs of necrobiotic change in the gland cell.

The positive Feulgen reaction given by the large granular intranuclear structures would seem to suggest that they are nucleoprotein in nature and formed as a product of abnormal nuclear metabolism, since they have not been seen in a considerable series of normal pig turbinates. The smaller bodies have likewise not been seen in material from normal pigs and their staining reactions resemble those of virus-type inclusions rather than nuclear material. Though the intranuclear structures are unlike anything previously reported in the pig, certain similarities to the inclusions observed in the salivary glands of guinea-pigs (Jackson, 1920) and the renal epithelium of human infants (Cappell & McFarlane, 1947) taken together with the predominantly lymphocytic response of affected mucous-membrane suggest that a virus may be involved. Furthermore, the globules of phloxinophilic material located around the periphery of the nucleus in pockets formed by a network of nuclear chromatin are reminiscent of the intraneuronal inclusions seen in Aujeszky's disease of the pig.

If this is a virus disease then it is probably one which has gone unrecognised for a considerable time. It may, of course, be a cause of atrophic rhinitis since it is to be expected that any severe, prolonged inflammatory process involving the whole nasal mucosa would produce hypoplastic and atrophic changes in the turbinates of a rapidly growing piglet.

All the I.B.R. material so far examined has been from acute cases in which death occurred in the first one or two weeks, but more chronic cases may well have shown a comparative absence of inclusions and more pronounced atrophy. In only one case diagnosed on gross and microscopic lesions as atrophic rhinitis have inclusions been seen, and that was in a piglet between three and four weeks old which was killed for diagnostic purposes. As piglets which succumb to I.B.R. usually do so in the comparatively early stages of the disease, there may be insufficient time for a great deal of atrophy of the turbinates to develop, whereas by the time conspicuous atrophy has occured the intranuclear inclusions may have disappeared.

At the present time atrophic rhinitis, like ozaena in man, can be considered as an entity only from the point of view of morbid anatomy. It may well be that several aetiological agents will be found which alone or in combination can produce atrophy of the turbinates. The cause of I.B.R. may or may not be one of them.

Summary

(1) The clinical and pathological features of a type of rhinitis occurring in piglets in the first few weeks of life are described.

(2) Pathologically the disease is characterised by the presence of large granular basophile inclusions and smaller acidophile inclusions in the nuclei of the mixed glands of the nasal mucosa.

(3) The possible aetiology of this condition and its relationship to atrophic rhinitis are discussed.

The Use of Gonadotrophic Hormone in Goats During the Anoestrous Period

BY

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Introduction

IN the northern hemisphere goats are in anoestrus from approximately March to August. Several workers (Stevenson, 1938; Hammond, 1943; Frank, Schott & Simmons, 1945; and Folley, Greenbaum & Roy, 1949) have attempted to stimulate oestrus and ovulation during this period by parenteral inoculation of gonadotrophic hormones and have reported varying degrees of success. The most successful treatment appears to have been that of Stevenson who used pregnant mare serum and obtained conception in seven of 13 animals.

This communication describes the application of the principles evolved by earlier workers, by means of which seven of ten goats were stimulated to conceive in the months of April and May.

(*Continued overleaf*)

Acknowledgments.—To Dr. A. W. Stableforth, Director of the Veterinary Laboratory, Weybridge, for permission to publish this paper; to my colleagues in the Field and Investigation Services of the Ministry of Agriculture and Fisheries, for providing the material on which this work has been based; and to N. W. Lacey, F.I.M.L.T., of the Veterinary Laboratory, Weybridge, for technical assistance in preparing the histological specimens.

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Addendum.—Since this paper was prepared we have been able to demonstrate typical inclusion bodies in piglets in the early stages of naturally occurring and experimentally induced atrophic rhinitis.

Furthermore, atrophic rhinitis has been set up in susceptible piglets by the intranasal installation of nasal washings or ground up turbinates from cases of inclusion-body rhinitis.

Although it is possible that there are two distinct aetiological entities, inclusion-body rhinitis and atrophic rhinitis, which may coexist in the same animal, it would seem more likely that inclusion-body rhinitis is a specific infectious condition to which atrophy of the turbinate bones and distortion of the snout are frequent but non-specific sequelae.

This work will be reported in detail at a later date.

Materials and Methods

Animals

These were 10 cross-bred two-year-old goats, nearing the end of an abnormally short (four-month) lactation in which they had been experimentally infected with *Str. agalactiae*. The organism had been eliminated from the udder with penicillin. The animals, together with an adult male, were housed as a group in a large loose-box.

Hormone treatment was used because the animals would have been unproductive for some eight months (the mastitis experiment having reduced milk yield to low levels) unless they were bred in anoestrus.

Hormone

Gonadotrophic hormone (P.M.S.)* was inoculated intramuscularly, each animal receiving a first dose of 1,000 i.u. and a second, 24 days later, of 750 i.u. The inoculations were spaced thus because it was found in ewes (Hart & Cole, 1936) and in goats (Stevenson, 1938) that two doses at approximately the normal cycle interval were required to produce oestrus and ovulation during deep anoestrus.

Results

Signs of oestrus were noted within 24 hours of the first injection, and continued for about three days. The male was observed serving, but the number of females covered was uncertain. The excitement of the male was intense, so much so that he became almost vicious and was replaced after two days by another adult male. This animal was also observed serving, and he too became greatly excited. The males were alternated thereafter, a few days at a time, until the effects of the second injection had subsided. The effect of the second inoculation was less obvious, possibly because several of the animals had become pregnant.

The results are summarised in the Table herewith, and it can be seen that seven of the animals conceived. Parturition occurred 154 to 173 days after the first injection of P.M.S. If the normal gestation period of the goat is taken as 151 days (Dukes, 1947, range 147 to 160 days) it seems likely that six of the goats conceived after the first injection, and the seventh after the second injection. Apparently, therefore, the second injection did not harm the six animals already pregnant. Pregnancy and parturition were normal in all animals. There was no evidence of superfoetation, and no weakly kids were produced. The ratio of 13 kids to seven dams is about the figure expected in the Compton herd.

TABLE

THE RESULTS OF INTRAMUSCULAR INJECTION OF 10 GOATS IN ANOESTRUS WITH 1,000 I.U. OF GONADOTROPHIC HORMONE, FOLLOWED AFTER 24 DAYS BY A SECOND INJECTION OF 750 I.U.

Number of goat	Length of lactation when treated with P.M.S. : days	Interval between first P.M.S. injection and parturition : days	Number of kids
1	118	154	1
2	107	155	3
3	110	157	2
4	104	157	1
5	105	160	1
6	108	160	2
7	128	173	3
8	130	—	—
9	116	—	—
10	108	—	—

* Antostab : Boots Pure Drug Co., Ltd.

Discussion

The results reported by Hammond and by Folley *et al.* indicated that although P.M.S. would stimulate oestrus and ovulation in anoestrous goats fertility was low. Thus, Hammond found four animals pregnant out of 17, and Folley *et al.* 10 out of 35. There is no significant difference between these figures, but there is a significant difference between them and those reported here (for Hammond's figures X^2 (Yates) = 3.87 and $p = 0.05/0.02$ and for Folley *et al.* X^2 (Yates) = 4.05, and $p = 0.05/0.02$). The likely explanation seems to be that at Compton the males were allowed to run with the females, whereas the other workers relied on the attendant's acuity to detect signs of oestrus and to take the female to the male for service. Stevenson's results were as good as those reported in this communication, but he gave no details of the method of service.

Summary

Seven of 10 anoestrous goats in late lactation, running loose with adult males, produced 13 kids following two intramuscular doses of gonadotrophic hormone (P.M.S.) with an interval of 24 days between injections.

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AUSTRALIA WITHOUT RABBITS

In view of the observations of the Myxomatosis Advisory Committee published on page 534 of this issue, the following note is of particular significance. A vast increase in Australia's wool production is currently reported. The Commonwealth Bureau of Agricultural Economics, in a cautious statement, estimates the total annual increase in the value of the wool clip, ignoring all causes other than myxomatosis, at £20m. sterling. It has added to this £8m. for the value of extra sheep and lambs grazing, and the additional sheep and lambs slaughtered.

To this, the Bureau says, should be added the saving in the cost of rabbit control, and the long-term benefit to pastures.

There are now 127 million sheep in Australia compared with 116 million in 1950-51. Probably the biggest cause of this development is several years' high wool prices, but myxomatosis has played a considerable part in it.

Sheep Dips

Changes which may occur in a bath during the dipping of sheep and observations on the probable time for which dips may be retained in the fleece

BY

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WORK reported in this paper was carried out as part of a programme connected solely with eradication of sheep ticks, *Ixodes ricinus*, L., but the findings will probably be of some value when applied to problems involving attack on other ectoparasites of sheep.

Most of the dips produced in Great Britain previous to 1945 were of the arsenical or phenolic classes. The active principles were water soluble in the concentrations at which they were used, and bath concentrations were believed to remain fairly constant during dipping. Now, however, organic compounds, notably DDT (2,2,bis-p chlor phenyl 1,1,1, trichlorethane) and BHC (benzene hexachloride), have largely replaced other substances as active constituents of sheep dips. These materials are not water soluble and must be used in the form of emulsions or suspensions. There is evidence to show that physical characters of the diluted emulsions are very important, but the ideal to be attained is not yet fully understood. Thus, Heath & Mitchell (1946) classified as "good" protection against tick infestation obtained by dipping sheep in a miscible oil containing DDT (M37) at a bath concentration of 0.2 per cent. while a mayonnaise type of emulsion (M22) used at a bath concentration of 1.0 per cent. DDT gave results classed as "poor." They were unable to explain their anomalous results, but it is probable that particle size of the emulsion is important.

Materials and Methods

Most of this work was carried out prior to 1945, and the commercial dip which was investigated was of the arsenic wool-grease cresilic acid type. In all cases it was the same commercial product which was used.

Unless otherwise stated, all sheep used were Herdwick-Swaledale crosses.

The dipping bath had a capacity of 150 gallons, but dipping was possible at as low as 80 gallons. Two draining pens were available, each holding some 20 sheep so that, with the standard 30 second immersion time which was used, all sheep drained for not less than 10 minutes before being released. Each sheep was held in the bath by hand, the head being submerged at least twice.

Surface tension was measured by means of the instrument shown in Fig. I. Glass distilled water rose to 5.4 cm. on the scale and, assuming this to represent a surface tension of 73 dynes per cm., surface tensions of dips were calculated as a direct proportion of this figure after recording their rises in the capillary tube. Dip samples were taken from about 6 inches below the surface of the bath and the sampling bottle was dragged along the length of the bath after removing the cork under water. Three readings were made in each case, the average reading being recorded. The range of these three readings was in no case more than 3 mm. As a check, a similar instrument manufactured by the National Physical Laboratory to the design of Dr. J. G. Mitchell, Chemical Research Laboratories, Teddington, was used on two occasions. Both instruments recorded almost identical surface tensions.

Attempts to record viscosity by means of an Ostwald viscometer failed because the instrument invariably became clogged with particles of sand.

Results

Amount of dip removed by sheep

When calculating the dip required for a flock, it is usual to assume that each sheep will use half a gallon. Using Merino sheep, Hambrock and Wilken-

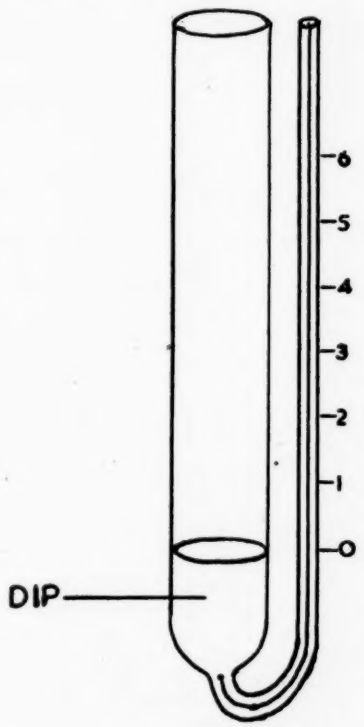

FIG. 1.

Jordon (1934) found that each sheep removed an average of 0.59 gallons, and Duncan (1946) states that the average New Zealand cross-bred sheep carrying two months' growth of fleece removes about three-quarters of a gallon of dip. Milne (1945), using Herdwick and Blackface sheep, found that each sheep removed an average of 0.55 gallons of dip. In the present work, 878 sheep dipped shortly after being sheared removed an average of 0.27 gallons, while 586 similar sheep in full fleece removed an average of 0.51 gallons of dip per sheep.

On eight occasions a total of 86 Cheviot hoggs in full fleece were lifted directly from the bath into a large tank and, about one minute afterwards, were transferred to a draining pen. The average quantity of dip removed from the bath by each sheep was 4.8 gallons, of which 3.5 gallons drained from the fleece within one minute.

From the above figures, it follows that when, say, 100 sheep are passed through a bath, about 480 gallons are removed, of which 430 gallons return to the bath *via* the floor of the draining pen. Add to this the inevitable contamination by faeces and urine and dirt washed off the body of the sheep, and it follows that marked physical and chemical changes may be expected to occur in the dip. Chemical changes which might occur in arsenical dips were investigated by van Zyl (1918) and Turner (1943).

Surface tension changes during dipping

Hobson (1939) recorded an initial surface tension of 73 dynes per cm. in a bath of anti-fly dip, this dropping to 43 dynes per cm. after 264 sheep had passed through the bath. He ascribes the fall in surface tension to extraction of suint from the fleece. Milne (1945), using the drop-spread method of measuring surface tension, recorded a rise of 2 dynes per cm. (from 48 to 50 dynes per cm.) on two occasions during the dipping of 179 and 281 sheep. He states: "this increase is statistically significant (by the 't' test)."

Tables I, II, and III, show results obtained in this work. It appears from these that surface tension changes in the bath are variable (*cf.* Milne, 1945), but that if the initial surface tension be high, it will tend to become lower as sheep are passed through the bath. Hobson (1939, 1941) states that "lowering the surface tension causes a dip to penetrate the fleece more readily, but it also facilitates drainage from the fleece after immersion" and this "results in a smaller and less stable deposit of poison in the fleece." No evidence is presented in support of these statements, but it is possible that too close an analogy to plant spraying has been drawn. It is difficult to understand why low surface tension of the bath should render the deposit in the fleece "less stable." From results obtained in trials of anti-tick dips, it appears that a good dip must be an excellent wetter. In any case, no amount of wetter that could conveniently be added to a dip would produce an appreciably lower surface tension in used wash than does suint itself. Ill effects due to low surface tension are of little importance.

Hill (1946) found that the presence in dips of wetting agents such as suint or soap did not affect the

TABLE I
SURFACE TENSION OF EXPERIMENTAL DIPS

Dip	Composition of dip	Surface Tensions: Initial Bath	Surface Tensions: After dipping 30 Sheep
		dynes/cm.	dynes/cm.
27	Low temp. Tar phenols. Sod. arsenite	32	32
29	0·22 per cent. Sod. arsenite	54	59
25	Low temp. Tar phenols.	31	30
26	Low temp. Tar phenols	28	31
37	Lauryl thiocyanate in liquid paraffin	34	50
41	Neutral wool grease	32	31
42	Low temp. Tar phenols. Neutral wool grease	32	35

TABLE II
COMMERCIAL DIP USED AT A BATH CONCENTRATION OF 0·187 PER CENT. As_2O_3. SHEEP RECENTLY SHEARED

	Surface Tension
	dynes/cm.
Initial bath	32
After dipping 25 sheep	35
" " 50 "	34
" " 75 "	34
" " 100 "	32
After adding 40 gallons of dip	31
After dipping 125 sheep	31
" " 150 "	30
After allowing bath to settle for one hour	32
After dipping 175 sheep	35
" " 225 "	35
" " 275 "	31
" " 300 "	38
After adding 40 gallons of dip	35
After dipping 350 sheep	32
" " 400 "	34
" " 447 "	35

TABLE III
WATER TAKEN FROM A STREAM RUNNING THROUGH PEAT BOGS. SHEEP IN FULL FLEECE

	Surface Tension
Initial bath	70 dynes/cm.
After dipping 10 sheep	70 "
" " 20 "	66 "
" adding 32 gallons of water	65 "
" dipping 40 sheep	61 "
" " 60 "	61 "
" adding 21 gallons of water	58 "
" dipping 80 sheep	53 "
" " 100 "	45 "
" adding 24 gallons of water	43 "
" dipping 120 sheep	38 "
" " 140 "	47 "
" adding 20 gallons of water	47 "
" dipping 160 sheep	43 "
" " 180 "	41 "
" adding 21 gallons of water	Not recorded
" dipping 200 sheep	43 dynes/cm.
" " 220 "	41 "
" adding 21 gallons of water	41 "
" dipping 242 sheep	41 "

amount of arsenic retained in the fleece of Merino sheep.

Changes in pH during dipping

When sheep were dipped in water, the *p*H invariably rose from an initial value of approximately 6.0 to approximately 8.0 during the dipping of the first 50 sheep; after this, it stayed constant throughout the remainder of the dipping.

Removal of insoluble active constituents during dipping

Using M37 (Heath and Mitchell, 1946), a cationic miscible oil containing DDT, bath exhaustion trials gave results, one of which is summarised in Table IV.

TABLE IV

DIPPING AT CRAGG FARM, AUGUST 16TH, 1948. INITIAL BATH 150 GALLONS. SHEEP SHEARED SIX WEEKS PREVIOUSLY

	Bath Conc. (Gm. DDT per 100 ml.)
Initial bath	0·54
After dipping 3 sheep	0·45
" " 6 "	0·26
" " 10 "	0·17
" " 15 "	0·17
" " 20 "	0·16
" " 30 "	0·10
" " 40 "	0·08
" " 50 "	0·07
" " 75 "	0·05
" " 98 "	0·03
" adding 50 gallons dip	0·24
" dipping 252 sheep	0·03
" adding 50 gallons dip	0·20
" dipping 378 sheep	0·17
" adding 50 gallons dip	0·28
" dipping 553 sheep	0·17
" adding 50 gallons dip	0·29
" dipping 668 sheep	0·17
" " 701 "	0·17

At concentrations as high as 0.5 per cent. DDT, selective removal from the bath is so rapid that it would be unsuitable for general use on the farm. When the concentration has fallen to about 0.1 per cent. DDT, the bath strength tends to become more stable. Heath and Mitchell (1946) showed that rapid depletion of the DDT content of the bath may also occur in neutral and in anionic dips.

Retention of chemicals by the fleece

When field trials of dips were begun, it was felt that flow of "yolk" from base to the tip of the fibre might be a limiting factor to retention of chemicals by the fleece. The following work was designed to show how important this factor might be.

Lennox (1938), by staining bands on Merino sheep fleece with alcoholic Sudan III, showed that wool grease "flows" from base to apex of the wool fibre at a speed of about 8 mm. per month. This might play an important part in the removal of dips from the fleece so attempts were made to repeat Lennox's work on British hill sheep. Probably because of the low grease content of their fleece, compared to that of Merino, the stained bands were not sufficiently clear cut to permit accurate measurements, so the following method was adopted. On July 14th, 1943, six sheep were dipped in a bath of Spirit Red (fat soluble dye). The white band at the base of the fleece, representing growth of wool plus flow of grease, was measured on October 4th, 1943, each measurement being repeated at three places about 1 inch apart. Axillae were completely free from dye, but the groins were stained red except for, in some cases, a circle around the inguinal pouch. This was assumed to be caused by "flow" of grease over the surface of the groin. In the 82 days covered by the experiment, the average rate of "flow of grease" along the fibres, plus growth of wool was 3.8 cm. or, assuming rate of flow and growth to have been constant, 1.38 cm. every month (30 days).

Sodium arsenite is water soluble, and the following experiment was designed to investigate the possibility of this substance staying in the fleece in appreciable quantities for a reasonable period of time. Six hoggs were dipped in the commercial dip at a bath concentration of 0.22 per cent. As_2O_3. Samples of wool were removed from the hoggs at intervals after dipping up to 54 days; on the fourth and succeeding days, all samples were divided into proximal and distal portions by cutting across the fibres about 1 inch from the base. Arsenic contents of the samples were estimated by the method of Allcroft and Green (1935), results being shown in Table V, from which it will be seen that, even in the distal portions, loss of arsenic is not very rapid.

TABLE V

ARSENIC CONTENT IN MG. As_2O_3 PER GRAMME FLEECE

Time between dipping and sampling	Sheep Number 1		2		3		4		5		6	
	Prox.	Dist.	Prox.	Dist.	Prox.	Dist.	Prox.	Dist.	Prox.	Dist.	Prox.	Dist.
30 minutes	1·3	1·3	2·9	2·9	3·0	3·0	2·4	2·4	1·9	1·9	2·4	2·4
2 days	1·3	1·3	2·5	2·5	2·7	2·7	2·4	2·4	2·1	2·1	2·5	2·5
4 "	1·1	1·3	2·2	2·8	2·9	2·9	1·6	2·0	1·7	2·2	1·8	2·3
6 "	0·7	1·0	2·0	2·2	4·0	2·4	2·7	2·1	1·9	1·5	3·0	2·6
9 "	1·0	0·6	1·8	1·7	2·5	1·4	2·0	2·0	2·3	1·9	2·2	1·7
12 "	0·9	0·8	2·2	1·9	3·2	1·7	1·3	1·3	1·5	1·2	2·4	1·5
15 "	—	—	1·6	1·6	1·7	1·4	1·3	1·6	1·2	0·9	—	—
18 "	1·1	0·7	2·4	1·3	1·4	1·4	1·3	1·0	1·0	1·6	1·6	1·3
22 "	1·1	0·8	1·7	1·9	2·0	1·1	1·3	0·9	1·4	1·8	1·8	1·2
30 "	0·7	0·7	1·9	1·6	1·4	1·4	1·9	1·6	1·9	2·6	2·6	1·5
54 "	0·7	0·5	1·2	2·1	1·6	1·2	1·4	1·4	1·3	1·8	1·8	1·3

TABLE VI
ARSENIC CONTENT IN MG. As_2O_3 PER GRAMME FLEECE

	Time between dipping and sampling											
	2 hours			2 days			9 days			19 days		
	Sheep Number			Sheep Number			Sheep Number			Sheep Number		
	7	8	9	7	8	9	7	8	9	7	8	9
Suint	1·50	2·20	1·50	1·80	2·80	1·80	1·10	1·70	1·00	1·50	0·70	0·60
Grease	0·15	0·25	0·15	0·15	0·20	1·10	0·10	0·20	0·10	0·10	0·05	0·05
Dirt	0·20	0·40	0·40	0·20	0·20	0·50	0·25	0·20	0·35	0·30	0·10	1·10
Wool Fibre	0·30	0·30	0·30	0·30	0·40	0·25	0·30	0·45	0·40	0·25	0·20	0·15
Total	2·20	3·20	2·40	2·50	3·60	2·70	1·80	2·60	2·00	2·20	1·20	1·90
Raw Wool	2·40	3·40	2·90	3·00	4·40	3·50	1·90	2·90	2·00	2·20	1·20	1·00

Hambrock & Wilken-Jordon (1934) showed that, if wool samples from dipped sheep be divided into suint, dirt, grease, and clean fibre, more than half the arsenic retained by the whole sample will be found in the suint. This work was repeated and results obtained (Table VI) appeared to confirm Hambrock & Wilken-Jordon's finding. However, since suint was extracted by trituration of the grease-free sample in distilled water, it is to be expected that arsenic will have been removed at the same time, and the result loses much of its apparent significance. The following experiment was designed to show whether suint-free wool would retain as much arsenic as would normal fleece. By well washing a Cheviot hogg in several baths of hot water on each of three consecutive days, suint content of the fleece was reduced from 3.0 to 0.75 per cent. On the following day, this hogg, Number 10, was dipped in a bath of sodium arsenite at a concentration of 0.2 per cent. As_2O_3. Three similar hoggs, Numbers 11, 12 and 13, were dipped in the same bath. Immediately after being dipped, Numbers 10 and 11 were placed in a loose box to protect them from rain, the other two being run outside. Twelve days after being dipped, Number 12 was well washed in a bath of 50 gallons of cold water. No rain gauge was available for this experiment, but heavy rain fell on the 2nd, 4th, 6th 11th, 12th, 16th, 17th, 19th, 25th and 30th days after dipping; showers fell on the 18th, 20th, 24th, 37th and 42nd days after dipping. Arsenic contents of wool samples removed from these hoggs on 12 occasions after dipping are shown in Table VII, from which it will be seen that the presence in fleece of normal amounts of suint is not necessary for satisfactory retention of arsenic. Milne (1945) states: "the leaching action of rain, aided by disturbance due to winds, to body movements, and the external frictions against vegetation, rocks, the ground, etc. All these processes combine to keep the coat clean" (from dips). No evidence in support of this statement is presented and, when arsenic retained by hoggs Numbers 10 and 11 (kept indoors) is compared with that retained by Numbers 12 and 13 (kept outside during fairly wet weather) it appears that the "leaching action of rain, etc." has little, if any, effect on retention of dip by the fleece. Even thorough washing in water failed to remove an appreciable amount of arsenic from the fleece of Number 12.

A sample of fleece from a Cheviot hogg purchased four months previously and not dipped since purchase was cut into short lengths with scissors and thoroughly mixed. Sub samples were treated as follows:—

Samples 1, 2 *and* 3. Arsenic estimations; 0.17 mg., 0.32 mg., and 0.28 mg. As_2O_3 per gramme respectively.

Sample 4. After weighing, was well triturated in three changes of hot distilled water. It then contained 0.08 mg. As_2O_3 per gramme.

Samples 5 *and* 6. After weighing, was well triturated in a solution of synthetic detergent (sodium salt of the condensation product of a fatty acid chloride and metanilic acid) and then rinsed three times in distilled water. These samples still contained 0.02 mg. and 0.03 mg. As_2O_3 per gramme respectively.

Summary and Discussion

When active principles of a dip are water soluble, it is unlikely that the bath concentration will fall markedly during dipping, but materials which are used in the form of emulsions may be selectively removed. No reason to account for this has been found, but the following suggestions are advanced:—

TABLE VII
ARSENIC CONTENT IN MG. As_2O_3 PER GRAMME FLEECE

Sheep Number	Days after dipping											
	1	3	7	10	13	17	20	24	27	31	38	45
10	2·04	2·36	1·69	2·15	2·24	2·22	1·79	1·78	1·54	2·26	1·84	2·29
11	2·91	2·70	3·52	3·28	2·84	2·75	2·42	3·29	2·38	2·62	2·61	2·65
12	2·79	2·11	2·49	2·61	2·29	2·94	1·96	2·04	1·43	1·12	1·41	1·45
13	3·18	2·37	2·65	2·80	3·13	2·36	2·45	2·11	2·16	1·93	1·97	1·96

(1) Large (say, 2μ diameter) globules are "entangled" in the fleece of the first few sheep through the bath and these sheep carry away all the large globules as well as the normal amount of small globules contained in the volume of dip (about half a gallon) permanently retained in the fleece. The sheep thus acts as a filter which is dragged along the bath. The scanty data presented by Heath & Mitchell (1946) does not entirely support this hypothesis.

(2) A portion of the active constituent tends to rise to the surface of the bath and this is skimmed off by the first few sheep which pass through. M37 (the dip used in the work reported above) does, in fact, produce a visible scum of DDT, thus lending support for this theory. On the other hand, some of the dips in which bath concentrations fell rapidly during the work reported by Heath & Mitchell (1946) were very elegant emulsions. This problem appears to be of sufficient importance to warrant detailed investigation. Addison & Furmidge (1952) made an important contribution to solving the problem when they showed that passage of sheep through a dip may reduce the effective concentration of wetting agent almost to zero.

It is unlikely that *p*H changes during dipping would be an important factor, unless a dip depended on an acid medium for satisfactory emulsification. Suint extracted from the fleece would almost invariably render the dip slightly alkaline during the course of dipping.

As might be expected, surface tension changes in a dipping bath are erratic, but appear to remain fairly constant around 30 to 40 dynes per cm.

Arsenic is not quickly lost from the fleece and even persists after the sheep has been well washed in cold water. A sheep which had not been dipped for at least four months still had 0.29 mg. As_2O_3 per gramme fleece (mean of three determinations), and this arsenic was not "fast" in the fibre, as all but a trace was removed by washing in a detergent. This slow loss of a water soluble substance from fleece which is exposed to the weather is unexpected, and the phenomenon might be attractively explained by the theory that it is well protected from rain by the "shedding" action of the fleece. This, however, is unlikely to be the full explanation, because thorough washing of a sheep in cold water did not appear to affect the arsenic content of the fleece. A more likely reason is that during dipping in a fluid which wets well, some of the wool grease is emulsified and then redeposits on the fleece following evaporation of the dip. The film of wool grease over active principle would be likely to afford adequate protection from the solvent effects of rain.

Acknowledgments. The kindly interest shown by Dr. H. H. Green, under whose direction much of this work was carried out is gratefully acknowledged. Thanks are also due to Dr. J. G. Mitchell for estimations of DDT. The work was performed under the auspices of a co-ordinating committee of the Agricultural Research Council, and is published by permission of that Council, and of the Veterinary Laboratory of the Ministry of Agriculture.

The Comparative Incidence of Pneumonia in Sows and in Bacon Pigs with Suggestions on the Establishment of a Pneumonia-free Herd

BY

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COUGHING in pigs is now recognised to be very frequently a symptom of infection with virus pneumonia.

Over the course of a number of years one of us (P. L. S.) has observed that there appears to be less coughing amongst pigs as they grow older suggesting that, with age, recovery occurs with the development of a resistance or an immunity. This observation could be exploited in establishing pneumonia-free herds if proved correct. A favourable opportunity occurred to test this observation during October, November and December of 1954, when comparatively large numbers of sows in the Aberdeen area were received in the bacon factory at Dyce. These sows were of all ages but circumstances made it impossible to distinguish old from young sows. In all 670 pairs of sows' lungs were examined and pneumonia was present in 39, an incidence of 5·8 per cent. Pneumonia affected several lobes of nine pairs of lungs while in the remainder only one or more lobules were affected. For the purpose of comparison the lungs of all the pigs going through the bacon factory on two days were examined and of the 1,000 pairs examined 554 showed lesions of pneumonia, an incidence rate of 55·4 per cent. In this case 414 pairs of lungs showed extensive pneumonia affecting several lobes while 120 were mildly affected.

On the first day chosen for the examination of the lungs of the bacon pigs there was a large consignment of pigs from Orkney. In them the incidence of pneumonia was so low, in the region of 25 per cent., that it was discarded as giving an incorrect assessment of the real amount of pneumonia in the area. In order to give a more correct picture two days were then selected when the pigs arriving came in small numbers from many farms in the Aberdeen area. The incidence rate of 55·4 per cent. is comparable with 61·3 per cent.

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reported by Anthony (1952) in the Midlands, 42 per cent. reported by Betts (1952) from Cambridge, and 52 per cent. reported by Lamont (1938) in Northern Ireland.

If the incidence rate of pneumonia in gilts is in the region of 55 per cent. and that in older sows is in the region of 6 per cent. it would appear that there would be less risk in building up a pneumonia-free herd using old sows (risk one in 16) compared with using young sows (risk one in two) provided, of course, that the herd is not being built up from already established pneumonia-free herds only a few of which are yet in existence.

Building a Pneumonia-free Herd

Although the survey in the bacon factory has only recently been carried out the use of old sows for establishing pneumonia-free herds has been practised in this area for some time with satisfactory results. Because pneumonia is less common on farms where only a few sows are kept the farmer is advised to go to them to make his first selection of sows. Sows which have had at least three litters are chosen and are farrowed in arks in the field where the young pigs are kept until weaning. If coughing occurs in any pigs in the litter during the rearing stage the whole litter is discarded and the sow also unless she is a very good type when she is given a second chance. It is possible that some sows may remain carriers of pneumonia. At weaning the females are all run together in arks until about 16 weeks old when, if coughing is still absent, gilts are selected and they are allowed to run with the other pneumonia-free sows. For mating purposes an old boar is preferable but since the risk of infection from a boar at the time of service is limited a young boar from a herd known to be relatively free from pneumonia has been used occasionally. Within a year a farmer employing that method can have a large number of gilts guaranteed to be pneumonia free. It is important to be very observant of coughing and to be rigorous in culling all coughing pigs and those in contact. Once the herd is established very great care has to be taken in buying in new breeding stock. Sows should be kept in isolation until they have reared their first litter, for the absence of coughing in the litter is the best indication of the absence of virus pneumonia in the sow.

While this method of building up a pneumonia-free herd is efficient it has certain other advantages: (1) There is little difficulty in obtaining old sows. (2) The sows can be selected on performance since their records for at least three pregnancies will be known, and (3) old sows are less expensive than gilts so that the initial outlay is low. The only disadvantage is that it is essential to have some means of complete isolation of the sow and litter, and arks in the field are considered to be the most satisfactory.

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Myxomatosis

We have been asked by the Myxomatosis Advisory Committee to comment on myxomatosis, particularly concerning the effects of inoculation of wild rabbits with the Shope fibroma vaccine. The Second Report of the Advisory Committee on Myxomatosis has analysed the results of the spread of the disease amongst wild rabbits during 1954. In many areas, the percentage kills have been of an order of 99 per cent. so that rabbits are but rarely encountered. There are very few counties of Great Britain which have not been widely affected, and in some districts rabbits have been largely eliminated. It is of vital importance to agriculture that the benefits to farmers and land owners which have followed the drastic reduction in the rabbit population are not frustrated by a failure to eliminate those which remain.

During the winter, County Agricultural Executive Committees have co-operated with farmers, land owners and agricultural workers in using all available methods to eliminate the survivors. This year, in spite of the late season, reports have been coming in from all over the country of significant improvement in crops—mainly winter cereals and grass—due to the absence of rabbits. Where in previous years corn has been grazed bare to a considerable distance by rabbits from adjoining cover, growth is now vigorous right up to the edges of the fields. Though masked to some extent by the late season, the improvement both in quality and quantity of early grass is evident, and many farmers are already keeping more livestock and others are planning to do so. Some farmers are now confidently ploughing old rabbity grass for tillage crops or reseeding, and examples have also been reported of successful planting of young trees without the necessity of fencing against rabbits.

All this may be lost if rabbits are allowed to return, and the Myxomatosis Advisory Committee has repeatedly stressed that the present situation provides a unique opportunity of eliminating survivors, which will breed up again very rapidly if left undisturbed.

Some people, especially those with sporting rights, regret the passing of the rabbit, and have avowed their intention of reintroducing healthy rabbits on to land cleared by myxomatosis. There are also a few people who take the same attitude from a humanitarian angle. At a recent meeting, the Myxomatosis Advisory Committee gave serious thought to this problem, and came to the conclusion that, in view of the great damage done by wild rabbits to agriculture and forestry, it would be quite wrong for anyone to re-introduce rabbits which, even though attempts were made to contain them, would be a very real potential danger because of their astonishing breeding capacity. However justified a person may think he was in introducing rabbits onto his land for sporting purposes, even for training gun dogs, it is likely that a few healthy rabbits would in a very short time reinfest the whole of the area.

The Minister of Agriculture has already announced in the House of Commons that he will use all his powers against anyone who is found to have reintroduced healthy rabbits on his land; these powers include the serving of a notice on the occupier under

the Agriculture Act, 1947, while, if the land is in a rabbit clearance area, as designated under the powers of the Pests Act, 1954, even more prompt action can be taken to see that rabbits are destroyed.

The Shope fibroma vaccine is intended for the protection of the domestic rabbit and of animals kept in research institutes. It is possible that under various pretexts, veterinary surgeons may have been asked to inoculate wild rabbits against myxomatosis. There is, however, the very real danger that the use of the vaccine in this way could result in a building up of the wild rabbit population, and it is hoped that veterinary surgeons will give serious consideration to this matter before inoculating any wild rabbits brought to them, with the sole exception of those required for bona fide research or other scientific purposes.

Current Literature

Annual Report of the Veterinary Department of the Western Region of Nigeria for the Year 1951-52

The Assistant Director of Veterinary Services, Mr. H. K. Littlewood, begins his report with a complaint that shortage of staff is seriously retarding the progress of the Department's work in the region. Much remains to be done both in securing the effective control of disease and in the development of the industries in animal products before it can be said that the livestock population of the region is making a worthwhile contribution to agricultural development and to the social and economic life of the community.

Rinderpest appears in the region both endemically in the indigenous dwarf cattle, and introduced from time to time with the large consignments of beef cattle which are regularly arriving from the Northern areas.

The indigenous cattle of the region, like all cattle harbouring chronic trypanosomiasis, are notoriously highly susceptible to rinderpest infection and react to it with an often fatal intensity. For this reason the usual goat virus vaccine which in Zebu cattle gives consistently good results, cannot be used with safety in these cattle. Fortunately, it has now been found that lapinised virus vaccine, being much milder in action, can be used safely in these cattle in the production of a sound immunity.

Bovine Contagious Pleuro-Pneumonia

This is one of the serious cattle scourges of the region and indeed of the whole of Nigeria, if not also of most parts of Africa. Its prevalence among the cattle slaughtered in the abattoirs of the larger towns in the region, which are some of the chief end points of the great cattle trade from the north, gives some indication of the continued endemicity of the disease throughout Nigeria. During the year some 148 cases were so discovered.

Trypanosomiasis is rife in the region and affects all domestic animals. While the local indigenous cattle have, through residence in the area for many generations, acquired a solid premunition against infection, imported Zebu cattle and other animals readily fall victims. To such clinical cases the administration of antricide methyl sulphate and Fantorin has given highly satisfactory results. Fantorin especially, both in Zebu cattle and horses, has proved highly efficacious, curing quickly without relapse.

Piroplasmosis in horses yields successfully to treatment with phenamidine or babesan.

Hard pad, a disease of dogs (surely a recent importation to Nigeria?) appeared in the region during the year, spreading quickly. Cases benefited greatly from massive doses of B_{12} and sedatives.

The differential diagnosis of this disease from rabies, which also exists in the region, is likely to have presented a puzzling problem at times.

In poultry, the regular use of vaccines kept disease under control in the improved flocks of pure European and grade birds. Vaccinations during the year totalled 24,000.

The clinical treatment of sick and injured animals also receives attention at the various veterinary centres in the region.

Animal Industries

Animal by-products such as bonemeal, bloodmeal, and meatmeal are now being produced and the better preparation of hides and skins is being energetically fostered.

At the livestock improvement centres, the small indigenous types of cattle are being improved by selective breeding. In this way, while the economic usefulness of these animals is being increased, their inherited and indispensable adaptability to trypanosomiasis infection is being retained.

W. W. H.

ABSTRACTS

Radiological Examination of Human Contacts of the Tuberculin Positive Cow-Tubercle. McKINSTRY, R. N., & BLAMPIED, T. LE Q. (1955). *The Journal of the British Tuberculosis Association.* Jan., 1955. **36.** 1, 16–17.

This article deals with tracing human cases of tuberculosis that were thought to be responsible for the appearance of tuberculin positive cows in herds in Jersey that had hitherto been free of reactors. Six incidents are recorded. In one herd the farmer was found to have open pulmonary tuberculosis. In the second herd the farmer had a cough with occasional haemoptysis, a radiograph showed advanced bilateral disease with cavitation. On a third farm a French farm worker was found to have open respiratory tuberculosis. In the fourth instance a cowman had pulmonary tuberculosis. In the fifth the farmer had open pulmonary tuberculosis and in the sixth the cowman had a cavity in the right upper zone of the chest. It is assumed but not proved that all these cases were caused by the human type of tubercle bacillus.

The proportion of tuberculin positive cows found in these herds was substantial but the figures given do not enable the precise proportions to be estimated. A number of the tuberculin positive cows were slaughtered but in none of them were lesions of tuberculosis found.

In one herd of 100 cattle 50 reactors were found. In all 19 of these reactors were slaughtered and no tuberculous lesions were found in any of them. Of the 50 reactors 33 were re-tested ; 27 per cent. had become

negative in three months ; 39 per cent. in six months, and 42 per cent. were known to be negative at the end of one year. The authors suggest that through time all the reactors might have become tuberculin negative.

From these observations the authors conclude that in a tuberculosis-free herd the human source of infection with the human strain of tubercle bacillus is important not as a producer of active tuberculosis but as a source of reactors. They go on to suggest that " sporadic cases of bovine tuberculosis which do occur probably result from cases of open respiratory tuberculosis in human beings infected with the bovine bacillus."

No references are given in this publication. It adds greatly to the interest and value of these writers' observations to take their work in conjunction with the papers abstracted below.

Tuberculosis in Cattle Caused by Infected Personnel. SJOLLEMA, P., & SCHAAF, A. V. D. (1951). *Tijdschr. Diergeneesk.* **76.** 783–791. (English summary.)

This author reported on two dairy herds in Friesland where wholesale infection with tuberculosis was caused by persons with pulmonary tuberculosis of bovine origin.

In the first case, a farm worker's positive sputum was shown to contain a pure bovine type of tubercle bacillus. It is contended that in two years this man had infected at least 100 head of cattle.

In the other case, the farmer himself was the spreader of the bovine type of infection. He had succeeded in infecting 42 head of cattle.

Post-mortem examination of the infected cattle demonstrated that infection had been acquired by inhalation.

Epidemiology of Tuberculosis. BLACKLOCK, JOHN W. S. (1947). *Vet. J.* **103.** 322–334. Also *B.M.J.* May 24th, 1947. **1.** 707 *et seq.*

Infection with the bovine type is found chiefly in cattle, though many other types of animals and also man are liable to be infected. The chief mode of spread in cattle is by droplet infection, and thus, as in man, the primary lesion is most often in the lungs. Man is infected with bovine bacilli chiefly through the ingestion of contaminated milk, though air-borne infection is also possible, as is well exemplified in the cases of bovine conjunctival tuberculosis in milkers reported by Jensen *et al.* (1940). The cycle of infection, however, does not stop there, as it has been observed that bovine infection may pass back from man to cattle and also from man to man, as in the five proved cases reported by Griffith *et al.*

The human type of tubercle bacillus may also infect cattle, as it has been observed that cows in contact with a human case of pulmonary tuberculosis, though developing no sign of active disease, may give positive tuberculin reactions. Many of these cases have been proved by the isolation of a human type of bacillus from the tissues of cattle which may show no active disease or minimal lesions in either the respiratory or the alimentary system. Neither Hindersson (1933) nor Plum (1936, 1937) succeeded in isolating human tubercle bacilli from the milk of cows naturally or experimentally infected with the human type. Thus infection of cattle with the human type is more of a nuisance, as it results in confusion at tuberculin-testing : bovine infection, on the other hand, usually gives rise to serious losses. Someone in contact with a previously clean herd should be suspected when many positive reactors suddenly appear at routine tuberculin-testing.

Tuberculosis in Man, an Animal Health Problem. FOURIE, P. J. J. (1952). *Onderstepoort J. Vet. Res.* **25.** No. 3. 7–37.

This rather long article deals with the Onderstepoort herd of experimental animals which amounts to 224 cattle. In 1949, after nine years' freedom from reactors to the tuberculin test, 10 positive reactors were found. Lesions of tuberculosis were present in six animals ; in four of these, the bovine type was identified, in two typing was not completed, in a seventh animal the lesions were those of actinomycosis and it is suggested that the reaction to tuberculin was due to non-specific sensitisation. The writer is so convinced that no cases of bovine tuberculosis existed in the vicinity of the herd that he is forced to the conclusion that these cattle were infected by the natives who were suffering from tuberculosis caused by the bovine type of organism. In the three remaining positive reactors, no lesions were found and it is suggested that these animals were sensitised with infection of the human type. In support of this, a native animal attendant was shown by X-ray examination to be suffering from pulmonary tuberculosis. The organisms were not identified in his sputum nor have they been typed.

The Control of Bovine Tuberculosis. DALLING, T. (1949). A paper presented at the Animal Diseases Meeting, Warsaw, 1948, and published with others in December, 1949, under the title " Some Important Animal Diseases in Europe." F.A.O.U.N., No. 10, page 69.

In Great Britain there is little evidence of the presence of infection in cattle with *M. tuberculosis* of the human type. It has been found, but its incidence appears to be small. Its presence complicates tuberculin-testing for, by the methods at present in use, it is not possible to differentiate between sensitivities associated with the human and bovine types of the organism. The sensitivity from the human type, however, is of comparatively short duration and by repeated testing a differential diagnosis can eventually be made.

G. F. B.

DIGEST

Systemic mycotic infections of animals

The systemic mycotic infections of animals provide the subject of several reports, and editorial comment, in the April numbers of two American monthly veterinary journals.

Granulomata of the mediastinal and bronchiole lymph nodes of 11 beasts and one pig were ascribed by Davis *et al.* to infection by the fungus, *Mucor* (*Lichtheimia*) *corymbifera.* The growths had been submitted as

tuberculous lesions, which they closely resembled, and were observed to consist of necrotic tissue studded with foci of calcification. However, microscopic examination revealed the branching hyphae of the fungus in the necrotic tissue. The *Mucor corymbifera* was cultivated, with difficulty, from some lesions and proved to be pathogenic to mice, into which it was inoculated by intravenous injection. It was again recovered from the viscera of these animals thereby providing the evidence by which this fungus was incriminated as a potential pathogen to cattle, pigs and rodents. All the affected cattle were beef type, and their ages ranged from six months to five years. The distribution of the granulomata, *i.e.*, the mesenteric and bronchiole lymph nodes, suggested that infection was acquired by inhalation or oral ingestion.

Burger & Levan record three cases of a systemic infection in the dog due to *Coccidioides immitis*. Coccidiomycosis is endemic in certain parts of America where it is known to affect man causing lesions of the skin and lungs. All the three dogs, which were aged 7, 12 and 18 months, had respiratory symptoms, and two died as a result of the dissemination of the fungus throughout the body with metastases in the lymph glands, and granulomata on the ribs and the lower extremity of the tibia. The third dog recovered. There was no response to antibiotic or sulphanilamide treatment. Diagnosis was made by serological tests which were confirmed in the fatal cases by the identification of the causal organism in smears from necrotic tissue.

An abstract of a survey by Emmons suggests that birds may be the source of some potentially pathogenic fungi. *Histoplasma capsulatum*, which can infect man and animals, and has been reported from the United Kingdom, was isolated from a number of soil samples which had been contaminated by chicken droppings. Soil containing the excreta of pigeons was found to harbour the spores of *Cryptococcus* species. The author inclines to the view that soil enriched by the bird excreta creates favourable conditions for the saprophytic growth of the fungi.

The Editorial of the *J.A.V.M.A.* comments on the increased interest now shown in animal mycoses. The view is expressed that fungus infections in man and animals have increased in incidence and variety. Reference is made to the current belief that the destruction of bacterial flora by the widespread use of antibiotics has created a vacuum which can be filled by fungi resistant to the antibiotics in common use. Some of the new antibiotics, however, are reported to have fungicidal properties.

D. W. J.

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University News

London

At a General Meeting of the Royal Veterinary College Student Union Society on July 1st, the students presented Professor J. McCunn with a memento of his year as Acting Principal. The gift took the form of a solid silver tobacco-jar bearing the Union Society crest and the following inscription:—

Presented to
Professor J. McCUNN, F.R.C.S., L.R.C.P., M.R.C.V.S.
(Acting Principal 1954-55)
by the students of the Royal Veterinary College
in appreciation of his constant interest
and guidance in all their activities
1st July 1955

In making the presentation, the President of the Union thanked Professor McCunn for the interest that he had always taken in the welfare of the students passing through his hands and in particular for all that he had done during the last 12 months.

Professor McCunn replied, amid laughter, that it was somewhat of a relief to find that he was no longer personally responsible for the students and their activities. Nevertheless under the Principalship of Professor Glover, another London graduate, he would continue to work for the mutual benefit of the College and the students. He thanked the members for the gift and added that, in view of the recent price increase he was pleased to find that it had already been filled with tobacco!

Edinburgh

Former " Dick " students will be interested to hear of the recent appointment of James Boyce, Senior Technician in the Department of Medicine of the College, to the post of experimental officer at the A.R.C. Field Station at Compton, Berkshire. James Boyce had been at the " Dick " since 1928, and at a farewell meeting Professor G. F. Boddie, on behalf of the staff, made a presentation of a wireless set and spoke of the many years of valuable service which Boyce had given to the College.

In the College golf championship final, played at Glencorse on June 8th, the winner was C. S. C. Reid, Second Year, who beat Mr. I. S. Robertson, of the Hygiene Department.

The annual Staff *v.* Students Golf Match was played at Gullane on June 5th, and for the third year in succession the students were the winners, beating the staff by 13 to 3. Dr. W. C. D. Hare was beaten for the first time since this match was instituted, his opponent being P. J. Macnab, third year, who won by 3 and 2. The students are therefore the first holders of the Maymyo Cup which has been given by Mr. I. S. Robertson for presentation to the winners of the annual Staff *v.* Students match.

Glasgow

A Post-graduate Clinical Course will be held at the Veterinary Hospital from October 3rd to 7th (inclusive) 1955. Further information may be obtained on application to the Secretary, Post-graduate Clinical Course, Veterinary Hospital, Bearsden Road, Bearsden, Glasgow.

★

Final Professional Examination

The following students passed:—Haresnape, Ian Clark, Blackpool; Hutchison, James, Kilmarnock.

News and Comment

ROYAL HONOUR FOR VETERINARIAN

Her Majesty the Queen has been graciously pleased to honour Captain T. L. Wright, M.R.C.V.S., her honorary veterinary surgeon, with the M.V.O. Readers will be aware that the various degrees of the Victorian Order are only conferred on those who have been privileged to give a direct service to the monarch.

THE ROYAL SANITARY INSTITUTE

As a result of the widespread interest shown in the "Look at Milk" Exhibition at present being held in the Royal Sanitary Institute's Museum of Health, the Institute, in conjunction with the National Milk Publicity Council, has decided to extend the closing date to Thursday, July 28th. Times of opening remain as before, namely, Mondays to Friday, 10 a.m. to 5 p.m., Saturdays, 10 a.m. to 12 noon.

The Royal Sanitary Institute announces that during the period of the reconstruction and modernisation of the Institute's Museum of Health which it is anticipated will take several months, the Museum will be closed to students and members of the public as from August 1st, 1955.

Further information will be made available later about the official re-opening date which is expected to be in the spring of 1956.

VETERINARY SERVICES IN AFGHANISTAN

We are indebted to the librarian of the Royal College of Veterinary Surgeons for forwarding a translation, by Mr. A. G. Sharan, of part of an article recently published in the magazine *Karhana*. The issue is dated Hammel 1st, 1334 (*i.e.*, March 22nd, 1955) and the article is headed: Achievements of the Ministry of Agriculture during the year 1333 (March 21st, 1954 to March 21st, 1955). It continues:

To develop agriculture in the country, two basic methods are to be followed: to remove elements which are likely to decrease agricultural output on the one hand, and on the other to encourage means by which agricultural products will be increased.

Therefore, the basic programme of the Ministry of Agriculture covers the following:

Campaign against animal pests and diseases, damages incurred are estimated to have been millions of Afghanis annually.

Campaign against agricultural pests which have caused a decrease in the country's agricultural products, both in quantity and quality.

Improvement in stock-breeding, with a view to obtaining better stock and more of them.

Improvement of plants with a view to elevating the level of agricultural output in the country.

Training personnel and supplying technical equipment to implement the aims mentioned above.

Campaign against animal pests and diseases

To sum up, attention was focused on farming during the year 1333, which is characteristic of the country, and in this connection the Bini-Hessar Laboratory was being extended by the aid of FAO to permit production of vaccines to immunise animals against diseases. The scope of activity of the laboratory, as well as that of Ali-Abad Veterinary Hospital, was able to exceed that of the two precedent years 1331-32, and thus, the number of animals taken under treatment was 163,543.

During this year, laboratory researches embraced further discoveries on new animal diseases such as sheep pox, liver fluke, blackleg and anthrax.

Treatment was given free to animals in the two clinics at Ali-Abad and Bini-Hessar respectively.

Improvement in Stock Breeding

Qualified experts are now working at laboratories and experimental farms on genetic problems. Crossing of Friesian cattle with local bulls gave a very satisfactory result.

A number of Friesian oxen are made available to the Animal Husbandries in Ali-Abad and Bini-Hessar. So far, 150 cows were being crossed. The number of cross-bred calves will gradually be increased. Some of these are already being sold to farmers at a cheap price.

To get eggs and chickens from the viewpoint of high protein content, a number of chickens were obtained of Rhode Island and Leghorn types.

To improve wool production in the country, the Ministry took steps during the year 1333 with the aid of FAO to import 40 Merino sheep from Turkey (35 ewes and five rams) in which spinning capability is 65 to 70, and each produces more than six kilos. with 65 per cent. pure wool in it. Seventy-six local ewes were being crossed with Turkish rams under the supervision of Mr. LeRiche, FAO expert in Karakul, and local technical personnel. A further number of these sheep may be imported during the year 1334.

THE REGISTER OF VETERINARY SURGEONS

Under Section 25 (4) of the Veterinary Surgeons Act, 1948, and the provisions of Statutory Instrument No. 1150 of 1953, the name of the following member has been restored to the Register of Veterinary Surgeons:—

Mr. David McGeoch, 11, Greenlaw Avenue, Paisley, Renfrewshire.

FRENCH HOLIDAY EXCHANGE

In case there are any other members of the Association still interested in sending their children to France for a holiday and having French children in return, the following particulars may be useful.

Sarthe Region: Boy, 18 years old, wishes to exchange with English boy or girl.

Gers Region: Boy, 12 years old.

Seine-et-Marne Region: Boy, 17 years old, wishes to stay *au pair* in England.

Maine-et-Loire Region: Girl, wishes to stay *au pair* in England for eight days.

Mayenne Region: Boy of 11 years: *or* boy of 9 years.

Yonne Region: Girl aged 17 years and girl aged 13 years (*au pair* or paying guests.)

Loiret Region: Boy, 11 years old.

COLONIAL DEVELOPMENT DURING 1954

The United Kingdom last year contributed a record amount of £15,936,820 towards the development and welfare of the Colonial territories. Of this sum £1,173,381 was for research.

New grants approved last year included £3,144,537 for agriculture and veterinary schemes. Research grants included £133,157 for agriculture, £83,767 for medicine, and £54,413 for locust control.

THE WEEK'S GOOD CAUSE

A broadcast in the Week's Good Cause series is to be given on Sunday evening, July 17th, for the benefit of the Animal Health Trust. The speaker will be Mr. Dirk Bogarde, the distinguished film actor.

PERSONAL

Birth

PITTAWAY.—On June 29th, 1955, to Heather (*née* Scott), wife of E. Michael Pittaway, M.R.C.V.S., 40 Queens Road, Coventry, a son.

R.C.V.S. OBITUARY

We record with regret the death of the following members of the profession:—

ASCOTT, William (O.B.E., T.D., J.P., Major R.A.V.C. (T.A.) retd.), Ashley, Abbotsham Road, Bideford, Devon. Graduated London, July 7th, 1885. Died June 25th, 1955, aged 91 years.

MACPHERSON, Charles (Capt., late R.A.V.C.), of the Ministry of Agriculture, Animal Health Division, Inverness. Graduated London, December 18th, 1918. Died June 27th, 1955, aged 68 years.

MR. CHARLES MACPHERSON

Mr. A. C. Urquhart writes:—

The death of Charles Macpherson, M.R.C.V.S., on June 27th, removes one of the best known and most popular members of the Ministry of Agriculture's veterinary staff. As a veterinary surgeon he will be chiefly remembered for his work over a period of about 25 years in eradicating sheep scab from the Highlands and Islands of Scotland. He was an expert on the diagnosis of sheep scab, and with his wide knowledge of local conditions and people he had the knack of getting stockowners to co-operate with him. Conscientious to a degree, he never spared himself, working long hours, often under very adverse weather conditions, and he was never known to ask a junior to do any job he would not willingly tackle himself.

"Charlie," as he was popularly known to his friends, was one of nature's real gentlemen. Many incidents could be related of his kindness and generosity to those less fortunate than himself. For example, in the police court to which he was cited to give evidence against a crofter for a contravention of the sheep scab regulations. The crofter was fined £5 with the option of seven days' imprisonment. Being so poor that he had no alternative but go to prison, Charlie unobtrusively slipped him a £5 note to pay the fine and refused to take any subsequent re-payment.

He died in Stornoway Hospital, Island of Lewis, following a heart attack and was buried in his native Island of Skye to which he was deeply attached.

The funeral was largely attended, and included Mr. Weir, D.V.S.M., M.R.C.V.S., representing the Chief and Deputy Chief Veterinary Officers, Mr. A. C. Urquhart, M.R.C.V.S., representing the Association of State Veterinary Officers, Mr. J. R. Anderson, M.R.C.V.S. and Mr. W. Corrigall, M.R.C.V.S.

MR. ALEXANDER H. MILNE

Mr. N. R. Reid, former Director of Veterinary Services, Tanganyika, writes:—

On May 18th, Sandy Milne, Chief Veterinary Research Officer of the Tanganyika Veterinary Department, lost his life when travelling in an East African Airways airliner which crashed on Mount Kilimanjaro. At that time, and by arrangement with the Tanganyika Government, he was interrupting a home leave journey to England in order to carry out a short consultative mission for the Food and Agriculture Organisation of the United Nations. He had been asked to advise on the establishment of a training course for Veterinary Assistants, work for which he was particularly well suited.

Sandy was born at Broughty Ferry, in Scotland, on October 5th, 1915. He grew up in Edinburgh and was educated at Watsons Academy and the Royal (Dick) Veterinary College, obtaining his Diploma in December, 1938. During that time, he played rugger and cricket with a good deal of enthusiasm and showed plenty of evidence of academic ability. The Colonial Service became his choice of career and he went to Cambridge on a Colonial Scholarship before taking up his appointment as a Veterinary Officer in Tanganyika in 1940.

His arrival in the Territory coincided with a major epidemic of rinderpest which was sweeping southwards and threatening to engulf the Rhodesias and South Africa. With no preliminary "breaking in" Sandy was pitched into the field along Tanganyika's southern border and for the next six months, until the epidemic was stemmed, it was inoculation, trek and inoculation. One incident in that campaign carried out at the height of the rains, stands out vividly. Crossing the flooded Msangano River with an administrative officer, the canoe turned over and Sandy narrowly got away with his life. All equipment was lost and for months afterwards malaria dogged his footsteps. At that time he wrote:

"ABANDON HOPE ALL YE THAT ENTER HERE

(Rinderpest Campaign 1940*)*

"So all day long the noise of cattle rolled,
Among the mountains like some sullen sea,
Whilst black men in their thousands, young and old,
Gave tongue in shrill and harsh cacophony.
And there I stood in mud up to the knee,
Gazing around me with a wild surmise,
And cursed the yelling throng that came and went—
For even Cortez would have damned his eyes,
If, wafted on the breeze, had come the scent,
Of human sweat, and Zebu excrement.
And when, as some new novelist had said,
'The Rains Came', all the world turned into slush,
I almost wished to God that I was dead,
Instead of witnessing the beastly rush,
of squelching cattle through a filthy crush . . .

. . . . . .

"When I grow old, and ready to depart,
These scenes will still be stamped upon my mind;
And *after* I am dead I think you'll find
That 'Rinderpest' is graven on my heart."

During the war, much as Sandy clamoured to be released to the army, Tanganyika beef for the African troops was a top priority and the duties of a provincial veterinarian claimed him until in March, 1948 he transferred for one year on temporary secondment to Makerere College at Kampala, Uganda. Here he lectured in Anatomy and Physiology and helped the Veterinary School over a very difficult time. On returning to Tanganyika he once more took over field duties and had charge of the Lake, Northern Tanga and Southern Highlands Provinces at different times. For short periods Sandy had worked at the Veterinary Laboratory and in June, 1953, he was asked to take over the appointment of Chief Veterinary Research Officer; an appointment which suited his academic capabilities in many ways better than the somewhat humdrum administrative routines of the field. He quickly reorganised the Laboratory and experimental farms and concentrated on improving the training of African veterinary technicians; a task which was always dear to his heart. In research, particularly in the field of trypanosomiasis, he was steadily producing valuable work and there is little doubt that Sandy was on the threshold of an outstanding career when this tragic accident occurred.

Perhaps a brief tribute to Sandy's character. He was a most lovable man. His native charm was allied to a deep sense of humour—albeit slightly sardonic at times. Celtic in temperament; when he was up he was right up. He loved music and literature and the good things of life; and Scotland—the Scotland of Sir Walter Scott and Burns. The memory of Sandy ringing out "The March of the Cameron Men" will not fade.

To his widow, Kae, his parents and his son, our deepest sympathy is expressed.

COMING EVENTS

July

14TH (THURS.). Summer Meeting of the Central Division, B.V.A., at The Royal Veterinary College, Streatley, Berks, 1 p.m.

20TH (WED.). Annual General Meeting of the Southern Region of the A.V.T. & R.W.'s at the Agricultural Research Council Field Station, Compton, Berks.

22ND (FRI.). Meeting of the Yorkshire Division, B.V.A., at the Ministry of Agriculture, Government Buildings, Crosby Road, Northallerton, 2.30 p.m.

Summer Meeting of the Mid-West Division, B.V.A., at the Bristol University Veterinary School, Langford House, Langford, 2.30 p.m.

28TH (THURS.). President's Invitation Luncheon and General Meeting of the Midland Counties Division, B.V.A., at the Swan Hotel, Stafford, 12.30 p.m.

Special Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, London, W.1, 10.30 a.m.

September

4th to 10th. 73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Durham. Rough Lea Farm, Hunwick, Willington (June 28).

Lincoln. Lawyers Farm, Holbeach St. Matthews, Spalding (June 30).

Yorks. Park Farm, Castle Howard (June 27).

Fowl Pest

Essex. 2, Verandah Cottage, Alresford, Colchester (June 29); Farding Farm, Terling, Chelmsford (June 30).

Hants. Kingfisher, Barrington Lane, Milford-on-Sea, Lymington (June 29).

Herts. 8, Council Houses, White Barn Lane, Furneaux Pelham, Buntingsford; 1, Queens Road, Ware (June 28); Offley Grange, Hitchin; Oxhey Lodge, Oxhey, Watford; 10, Mead Road, Shenley, St. Albans (June 29).

Kent. Balmoral, Dover Castle Hill, Istead Rise, Gravesend (June 29).

London. 1, Ashford Road, Walthamstow, E.17 (June 29).

Notts. 9, Selston Road, Jacksdale (June 28).

Suffolk. 32, Roughlands, Lakenheath, Brandon (June 29).

Surrey. Austins Poultry Farm, Fernhurst, Haslemere; 3, Bodmin Grove, Morden (June 28); 115, Croydon Road, Caterham (June 30).

Sussex. 149, Cowley Drive, South Woodingdean, Brighton, 7; Pratts Farm, Barnes Green, Horsham (June 28); Drawbridge Heath Camp, Horsham; 359, Franklands Village, Haywards Heath (June 29); Tye Oak Farm, Harting, Petersfield (June 30).

Yorks. 31, Kilner Bank, Mold Green, Huddersfield; Carlin How Smallholding and Allotments, Kilton Lane, Carlin How, Saltburn (June 30).

Swine Fever

Ches. The Mount, Bradley, Whitchurch (June 30).

Devon. Bow Mills Farm, Broadhempston; Shortacombe Farm, Crediton Hamlets (July 1).

Essex. Red Barn Farm, Great Oakley, Harwich (June 28); "Wadeside," Steeple Stone, St. Lawrence, Southminster (June 30).

Flints. Tyddyn Farm, Mold (June 30).

Lancs. Bolton's Farm, Blackgate Lane, Tarleton, Preston (June 29).

Middx. Orchard End Piggeries, Doris Road, Ashford Common (June 28).

Notts. Holme Farm, Claypole, Newark (July 1).

Oxford. The Green, Great Bowton, Banbury (June 28).

Salop. Manor Farm, Astley Abbotts, Bridgnorth; Abbey Farm, Hawkeston, Weston, Shrewsbury (June 28).

Staffs. Gorsey Hill Farm, Burton-under-Needwood, Burton-on-Trent (July 1).

Warwicks. Haseley Hall Farm, Haseley (June 28).

Worcs. Kingsford Farm, Wolverley, Kidderminster (June 28); Clent View, Woodlands Road, Dodford, Bromsgrove (June 29).

Yorks. 14, Cottage Holdings, Dunswell, Hull (June 28); 20, The Croft and Queens Ground Allotments, Barnsley (June 29); Manor Farm, Bentley, Beverley; Beckside Farm, Rimington, Clitheroe (June 7).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THE EFFECT OF THE CONTINUOUS FEEDING OF FURAZOLIDONE ON THE GROWTH OF GONADS IN SINGLE COMB WHITE LEGHORN COCKERELS

Sir,—Furazolidone (N-(5-nitro-2-furfurylidene)-3-amino-2-oxazolidone) has been found to be superior to a number of drugs in the treatment of *S. gallinarum* (Smith, 1954 (a), 1955) and *S. pullorum* (Smith, 1954 (b), Gordon & Tucker, 1955) infections in chickens when added to the ration at 0.04 per cent. for a period of 10 to 14 days. The use of the drug at the 0.015 per cent. level as a preventive of histomoniasis in turkeys would appear to be of greater value than its use as a treatment of the established disease (Horton-Smith & Long, 1955). The effect on bodyweight and sexual development when the drug is fed continuously does not appear to have been investigated to any great extent. Jacobs *et al* (1953) observed that furazolidone fed at the level of 25 mg. per pound of feed for 10 weeks had no stimulatory effect on the bodyweight of New Hampshire chicks kept in a clean environment. Conversely, Harwood & Stunz (1954a) reported that a growth stimulation similar to the antibiotic effect was produced when the drug was added to all-mash rations at 0.0055 to 0.02 per cent. This increased growth was most pronounced under conditions of poor sanitation (Harwood & Stunz, 1954b). Moore, Chamberlain & Carter (1954) in a paper given to the 43rd Annual Meeting of the Poultry Science Association, reported that furazolidone (NF 180) fed to breeding turkeys and to 10- to 12-week-old poults during both the growing and breeding periods had no adverse effect on egg production, fertility or hatchability. Unfortunately no levels of dosage were given in the abstract of this paper.

Investigations carried out by this Trust have failed to confirm the stimulatory effect of furazolidone when added to all-mash rations at levels of 0.005 to 0.2 per cent. and fed for 12 weeks using Single Comb White Leghorns as the test animals. There was, however, a significant reduction ($P=<0.01$) in the weight of testes taken from cockerels fed the drug at the 0.02 per cent. level. There were no differences in comb and wattle weights between the treated and control birds. Histological findings show, however, that even when the lowest level of the drug is fed, a retardation in spermatogenesis can be established, although these changes only become marked when the drug is fed at the 0.015 and 0.02 per cent. levels. Although serial sections were not prepared in the preliminary histological examination, sections stained with haematoxylineosin, taken from birds having been fed 0.02 per cent. furazolidone for 12 weeks, showed the most striking changes with a great number of tubules showing atrophy, while the remainder showed hypertrophy. In sections showing complete atrophy there was a total disappearance of cells, the tubules were reduced in size, and the lumen filled with eosinophilic material. Sections taken from birds which had been fed 0.015 per cent. furazolidone showed a moderate increase in interstitial tissue, with areas of hyperemia, disorder in the arrangement of cells in the seminiferous tubules, a scanty number of Sertoli cells and spermatids, and a complete absence of spermatozoa.

From these preliminary investigations it would appear that the continuous feeding of furazolidone at the preventive level may be carried out without adverse effect on bodyweight but that the drug should be used with caution if breeding stock are involved, until more knowledge is available as to the duration of the effect of the drug on gonad development. Further investigations are being carried out at the Trust's Poultry Research station and will be reported in full at a later date.

Yours faithfully,

D. M. COOPER and G. SKULSKI,

The Animal Health Trust,
14, Ashley Place,
London, S.W.1.

June 22nd, 1955.

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"A WELL OF ENGLISH UNDEFILED"

Sir,—Mr. Ogilvie is evidently a hyper-critic, and so should be trebly careful. His criticism of my use of words is not supported by their definition in the Oxford English Dictionary: where he suggests an alternative phrase it also has an alternative meaning, one which I did not wish to convey. In short, he has done nothing to invalidate my contentions.

Yours faithfully,

P. CROSFIELD,

Glovers Close,
Chipping Norton,
Oxon.

June 26th, 1955.

THE VETERINARY CLUB SYSTEM OF NEW ZEALAND

Sir,—May I make a few comments on Mr. Williamson's letter, published last week.

Prior to 1946, apart from work done by the Department of Agriculture, veterinary services in New Zealand were provided by a limited number of private practitioners (a few of whom were in established clubs). Limitations were imposed by the numbers of veterinary surgeons available, and a reason why more did not aspire to rural practice was the comparatively low value of individual farm animals.

It is evident these earlier shortcomings are appreciated by Mr. Williamson, and from his own experience in New Zealand he realises that "the Veterinary Club Scheme has done a useful task."

The Government became impressed with the need to provide more effective veterinary coverage than was hitherto possible by individual private practice and in 1946 the Veterinary Services' Act was passed. This legislation was designed to make provisions for the establishment and maintenance of veterinary services for farmers, and for that purpose to constitute a Veterinary Services Council and define its function and power.

The Council consists of ten members, comprising the Government, the Dairy, Meat and Wool boards (Primary Producer Organisations), the New Zealand Veterinary Association and Veterinary Clubs.

In the nine years which have elapsed since the passing of this Act, the Veterinary Club movement, sponsored by the Veterinary Services Council, has become firmly established, and it continues to expand. There are now some 150 veterinarians engaged in club practice, far outnumbering those in private practice or those in Government service, and even both of these last two categories added together.

The Clubs are financed by grants from the Veterinary Services Council (which has statutory funds available equivalent to £100,000 per annum), a levy from members plus a nominal fee for service.

The veterinarian is a salaried officer, which does not in any way create a precedent. Members of the profession, customarily, accept salaried posts, *viz.* government departments, Colonial service, local bodies, teaching institutions, research organisations, commercial firms, assistantships, etc.

It is obviously expected that something has to be exchanged in return, but in this particular case it is hardly necessary for me to affirm that the reference by Mr. Williamson to "unlimited work" is an exaggeration. What is expected is a normal achievement by a veterinarian—that he will at all reasonable times devote his time and personal attention to, and make his services available for, the treatment of the ailments and diseases of all livestock of club members within the assigned area.

There is no night work as known in this country, but like most occupations one has to take the rough with the smooth. In a seasonal industry there is a busy period and another when it is much easier; during this latter period four weeks annual leave on full pay is usually taken. Incidentally there are also 10 days statutory holidays, occurring periodically throughout the year, which the veterinarian is entitled to observe on full pay.

The Clubs are controlled by their members, generally through an elected executive body. How could they function otherwise?

Having over 30 years' experience working with New Zealand farmers, I am perfectly certain the employer/staff complex need never be stressed. The successful attitude of Club to veterinarian and vice versa depends entirely on the ordinary common sense adopted in human relationship. Unfortunately there are odd individuals singularly unmindful of this fact.

The form of contract is available for perusal by any intending applicants for the posts now being advertised, and they are at liberty to submit any question desired.

Yours faithfully,

C. V. DAYUS,
Agricultural Adviser.

New Zealand Government Offices,
415 Strand,
London, W.C.2.

July 4th, 1955

TREATMENT OF BULLS INFECTED WITH *VIBRIO FOETUS*

Sir,—We would like to rectify an error in our paper on the treatment of bulls infected with *Vibrio foetus* (*Vet. Rec.* June 18th, 1955). This is in Table II in which it is not indicated to which bulls footnotes a and b refer. They were bull No. 5 and bull No. 7 respectively.

We would also be glad of the opportunity to express our sincere thanks to Mr. D. Stephenson of the Wellcome Chemical Works, Dartford, who prepared the suspension. This acknowledgment was inadvertently omitted from the paper.

Yours faithfully,

F. A. EDGSON,
50, Friar Street, Reading.

J. SCARNELL,
Wellcome Veterinary Research Station,
Frant.

June 29th, 1955.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th June, 1955		23	—	—	5	—	99
Corresponding period in	1954	8	2	—	16	—	78
	1953	19	—	—	96	—	153
	1952	19	—	63	5	—	31
1st January to 15th June, 1955		425	—	6	247	—	770
Corresponding period in	1954	144	3	12	528	—	721
	1953	414	—	25	373	—	1,623
	1952	262	—	365	114	1	530